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BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE
FOREST INSECT INVESTIGATIONS

THE FIR TUSSOCK MOTHE
and
A COMBINATION OF INSECTS ON THE HUMBOLDT

1929

By
R. E. Balch

THE FIR TUSSOCK MOTH

R. E. Balch
Bureau of Entomology.

An insect, hitherto little known as a serious pest, has in the past year caused a good deal of concern in some of the western forests. Reports of extensive defoliations of fir in several states, from Nevada to British Columbia, have been found to be due to a number of simultaneous outbreaks of the Douglas Fir tussock moth (Hemerocampa pseudotsugata).

This moth was first noticed in large numbers at Chase, B. C., about 1918, and thought to be a variety of the California tussock moth. In 1921, however, it was described as a new species by McDonnough. Although there are reports of damage in California some years ago by what may have been the same insect, it was first definitely recognised in the United States in 1927 when it was reported defoliating alpine fir on the Humbolt National Forest at Jarbidge, Nev.

The following year it was noticed in Idaho in one or two places on the Weiser and Boise National Forests, and at the Craters of the Moon. In 1929 examination of these infestations showed that they were more extensive than had been expected. The whole of the Jarbidge Canyon was infested and on the Weiser and Idaho Forests some forty square miles had been seriously attacked. At the same time a considerable epidemic had been developing in north-eastern Washington in the neighbourhood of Northport and south of Grand Forks, B. C.

The small caterpillars of this moth commence feeding in the spring on the new foliage, but it is not until about the first of August that defoliation becomes severe enough to be noticeable at a distance. So heavy is the feeding in the latter stages that rangers have described the damage as appearing overnight. By this time the larvae are full grown. They are striking hairy caterpillars easily distinguished by two long, black tufts of hair behind the head, suggesting horns, and a similar one at the posterior end. On the dorsal side of the first four abdominal segments are dense light brown tufts, suggesting a toothbrush. The body is grey or light brown with numerous red spots.

Pupation commences early in August and the grey cocoon, made of silk mixed with the larval hairs will be found attached to the limbs and trunks and often to the underbrush. These frequently collect in large masses, particularly beneath the bases of the limbs, sometimes six or seven layers deep so that the lower ones are unable to emerge.

The moths appear in the latter part of August. The female is wingless, with a large abdomen covered with a mat of dark grey hairs. The male is winged, of a dark greyish-brown color. The female lays her eggs in a mass on top of her own cocoon and covers them with a frothy gelatinous secretion in which are embedded the hairs from her body.

The fact that the females are wingless makes it difficult to explain just how an infestation "spreads". The larvae when disturbed or in search of more food drop to the ground and travel quite rapidly--at the rate of about one foot per minute. They may be transported on the backs of sheep or cattle, and, when small, by the wind. But one would not expect an

infestation to spread rapidly by these means. The insect, however, is widely distributed and favourable conditions, probably in the main climatic, cause these epidemics to develop simultaneously in far separated districts.

The preferred host varies. At Jarbidge alpine fir is the species attacked. On the Weiser the severest defoliation is found only where grand fir is prominent. While the Douglas fir here is almost as closely stripped as the grand fir it has not been fed on where the latter is absent. At Roby Cr., near Boise, the attack is on pure Douglas fir. In Washington and B. C. Douglas fir is preferred and grand fir attacked only when mixed with it. An interesting condition is reported at one point on the Weiser, where the underbrush--chiefly Pachystima--has been fed on in preference apparently to the fir.

These epidemics seem to be all about three years old. There is evidence, however, that they have reached their peak. Parasitism of larvae and eggs is high and there has been heavy mortality among the larvae, apparently from starvation and disease. But already many of the trees are dead, while those which survive will have their leaders killed and become decayed.

Artificial control under present conditions is out of the question. Any method which destroyed the parasites would do more harm than good. However if an epidemic could be recognised before it became too large, effective control might be possible. This possibility is increased by the wingless condition of the female. A winter clearcutting of all trees, including reproduction, over the infested area, would starve the caterpillars, provided they were not able to survive on the underbrush. Burning the stand, crown and underbrush, would be more effective. Arsenicals applied in early summer would poison the caterpillars without damaging the trees--wherever conditions would permit their use.

In the present epidemic, however, it seems best to rely on natural control. The introduction of a large predaceous beetle (Calosoma sycophanta), which has proved a valuable enemy of the gipsy moth, is contemplated.

A COMBINATION OF INSECTS ON THE HUMBOLDT.

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The mining town of Jarbidge is situated within a deep canyon near the northern border of Nevada. Supplies are obtained over a road across the sagebrush desert from Twin Falls, Idaho, more than 100 miles away. The importation of timber is almost out of the question.

On the slopes of the canyon grow four species of trees: limber pine, alpine fir, aspen, and some mountain mahogany. The demand for mine timbers and fuel so far exceeds the supply that dead, partly decayed trees are often used in the mines and some coal is imported for fuel. As a result the officers of the Humboldt N. F. regulate the cut of all species carefully.

Some years ago, the mountain pine beetle appeared and bade fair to kill all the pine in the canyon. As a result salvage cuttings were made where possible and the fir was consistently favoured. In 1927, however, the fir tussock moth was found defoliating the fir, and by 1929 practically the whole of the canyon was infested by the moth and trees were beginning to die. Control was impossible and the fir in turn became a subject of salvage. Meanwhile the beetle has already killed some seventy per cent of the pine and is working vigorously on the remainder. At the same time the poplar is subjected to constant attack by a borer in cooperation with a fungus. The result is a sick-looking forest.

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To see such an area is to realize the need for a consideration of insects in any plan of permanent management. If a stand is to be protected from such destruction potential outbreaks must be detected in their infancy and measures of control applied before they get out of hand. Direct control is possible in the case of barkbeetles by treatment of the trees containing brood. The best hope for protection against defoliators seems to lie in silvicultural measures, in the production of mixed stands and stands of more rapid growth. There is still a lot of work to be done on problems of control -- and it is urgently needed.